# RTTY

COVER from KP4AQL

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## NEWS OF AMATEUR RTTY

JANUARY, 1966
30 Cents
Vol. 14, No. 1

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## HORSE TRADES

This page of the Bulletin is for use of amateurs who have RTTY EQUIPMENT FOR SALE OR TRADE and those looking for equipment to buy or trade. It is a free service and may be the means of getting someone on the air.

**RTTY, INC.**
372 Warren Way
Arcadia, California 91006
Return Postage Guaranteed

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**FOR SALE:** Test tapes on either punched paper, or AFSK on magnetic tape, runs 7 minutes, $2.00 each postpaid; 88 mhy toroids, uncased, 50¢ each or 5/2.00 postpaid. K5BQA, 11040 Creekmere, Dallas, Texas 75218.

**FOR SALE:** LARP-LARB, this is model 28 style non-typing reperf and tape reader on one base. Sometimes referred to as "multi-magnet reperf"—less motor, in good condition, $35.00 each, only two left. TRADE: Model 28 keyboard base in very good condition (no motor or gear goes with keyboard base separate item) for TYPING unit for model 28, in good condition. WANTED: Printer for model 28, also manual for model 26. K3AUD, P.O. Box 524, Republic, Pa. Phone (412) 785-6329 after 3:00 p.m. EST.

**FOR SALE:** 2125 and 2975 CPS dual tuning fork assembly, $33.00, .05% stability, 68 to 86°F. Transistor fork drive circuit kit, $10.00; assembled circuit, $16.00. Data available. Riverbank Laboratories, P.O. Box 65, Geneva, Illinois 60134.

**FOR SALE:** Table model Model 28KSR, will consider trade for Collins 75A4 receiver. Also have model 14 typing reperf with keyboard and TD for sale, $75.00. W8ELU, 7724 McCreary Road, Seven Hills, Ohio 44131

**WANTED:** Manual for CV-182, TM 11-278, built by Hallicrafters. WA4KOI/4, 1355 Virgilina Avenue, Norfolk, Va. 23503.

**FOR SALE:** Model 26 printer, has copy lights and inside paper holder, $40.00 or Trade. W6ITR, 9930 Lawlor Street, Oakland, California 94605.

**FOR SALE:** HT-37 with diode FSK and solid state rectification. Also, Drake 2B with 2-BQ Q multiplier and speaker. Ideal for RTTY. K1AFC, 228 Hickory Hill Lane, Newington, Conn. 06111.

**FOR SALE:** Model 26 with table, plus home built terminal unit, plus audio frequency shift keyer with two oscillator circuits, polar relay, and power supply. All are in good condition. $80.00 plus crating. WA0IPL, 3915 Sixth Avenue, Des Moines, Iowa 50313.

**WANTED:** Tight-tape stop lever for 14 TD. OZ8US, 1 B Ussing-Torsvang 101, LYNGBY, Denmark.

# FIFTH ANNUAL WORLD-WIDE RTTY SWEEPSTAKES RESULTS

**BUD SCHULTZ, W6CG**

**5226 N. Willmonte Avenue, Temple City, California 91780**

The battle of the bauds took place over ten weeks ago but both—bouquets and brickbats are still arriving at DX headquarters in fairly large numbers. However, the fact remains that from a standpoint of conditions and participation this was the biggest RTTY SS of all! Before we get too involved in post mortems let's take time to congratulate the winners who really turned in a tremendous effort. Sergio, I1AHN—who recently took top honors in the Volta Contest—established himself as one of the real DX stalwarts by running up the highest score ever made in the DX SS. It goes without saying that I1AHN gets the ultimate out of his gear and does a fine job of operating. Winning two such contests in a single year is a major achievement. Congratulations are also in order to Ingemar, SM6CSC, who ran a very strong second to the winner. As a matter of fact, a glance at the results will show that all the top scorers were extremely close and a country or two difference on the last eight places would have changed the positions of any of these participants. SM6CSC points out that he had the advantage of running a multi-operator station and was on the air for the entire contest time. Perhaps Ingemar's success will encourage more of the gang to try this in the future. Particular recognition should be given to K8MYF, WA4LWE and W2RUI who made fine totals in spite of the "five to one" exchange point handicap that the North American stations must abide by under the present rules.

At the risk of being redundant—let's discuss this rule business once more so there will be no misunderstanding about how it came about. The first SS contests were strictly "local" affairs with practically no participation by overseas stations because a contact with a foreign station counted the same as a Stateside (or VE) QSO and was usually a difficult, time-consuming business. For this reason the DX stations usually were ignored or covered up by the QRM and soon became discouraged. In order to encourage participation by overseas or foreign stations the committee decided to give a bonus for working DX countries and to give the overseas boys a ten point exchange point arrangement that would help them to compete on a fairly equitable basis. The idea worked very well and as the years went by more and more DX stations showed up for the Contest. However, the equipment, operating practices, and skill of the overseas group has improved so greatly along with the number of countries represented that the "shoe is now on the other foot!" An examination of the top ten winners in this contest will quickly show how far the pendulum has swung in the opposite direction. It is only fair to say at this point that all the comments received from the overseas stations regarding the present rules is that they would like to complete with the North American typers on an "even" basis. An interesting side light to the scoring is the fact that I1AHN would have still been in the top ten if he had used the 2 point basis of exchange allowed to the North Americans! If you are good at reading between the lines you probably already realize that a change in the scoring is in the offing for the next October SS Contest. The Contest Committee does not presume to suggest that it can come up with a set of rules that will be equitable to stations in every part of the World, but as more and more stations appear on the RTTY scene we will try and keep abreast of the situation. After all, it appears to this writer, the big thing is not necessarily whether one wins the top position. If you had a good time, worked a few new countries or States and had a chance to test your gear against the competition then you should consider the time well spent. If the thing was a "drag," you ended up in the XYL's dog house; you burnt up your gear trying to get a KW out of a 300 watt linear and ended up in 17th place—you shouldn't have gotten in the thing in the first place.

The biggest disappointment from the Committee's standpoint was the poor percentage of logs received—especially from the Stateside participants. There are several theories for this condition. One is that the rules are too complicated in the scoring set-up. This is really not a valid excuse because the scoring is simplicity itself! After you count up your exchange points, States, Countries and Continents it's merely a matter of some simple multiplication and addition to achieve the final result. The biggest task is counting the States and Countries worked and if this is done as the contest progresses it becomes a very quick and simple matter to figure one's score.

All six Continents were represented in the logs received this year but no one worked all of them. If you had some disappointments during the jamboree, give a thought to KA2RJ and KA2LD who sat over in Japan printing RTTY by the yard and couldn't work a soul except each other because of the regulation restricting them to 28 Mcs! This is real frustration! Some of us tried to get thru to them but that band was just not usable that weekend. Then there was the case of Pierre, XE1YJ, who had been preparing for the SS for months only to burn out his power transformer on Sunday morning just as things were opening up for him. If these aren't enough, consider the case of WA6WGL who blew his filament transformer on Friday night, the wind blew down his 40/80 meter inverted V on Saturday and he had high power transformer troubles on Sunday! In spite of all the QRM, equipment troubles, scoring inequities, etc., 99 percent of the comments received were favorable so it must be assumed that most of the RTTY'ers had a good time.

Continued . . .

SWEEPSTAKES RESULTS (Continued) . . .

Both the 40 and 80 meter bands were used much more this year for DX contacts in addition to the usual Stateside QSO's. On Saturday night 7040 Kcs sounded as busy as 14090 on Sunday morning! Several of the European Stations came through very well on 40 out here on the Coast and there were quite a few contacts made between North America and Europe on 80 meters. It was also noted from the logs received that the European Stations made much more use of the 28 Mc band than did the U.S.A. hams. A survey of the results indicates that in order to place in the top bracket of such a contest as the DX SS one must make use of all the available bands.

In closing I would like to personally offer a salute to the many contestants who took such pains to offer a neat and legible log. This year's crop was the best ever received and it made the job of checking quite a bit easier. If there was a prize for the neatest, most comprehensive log received it most certainly would have to go to Max, KP4AQL! His log was truly a work of art—bound in a paper cover complete with an ink drawing of the operator on one of the fly leafs. As a matter of fact we liked the drawing so well we took the liberty of reproducing it on the cover of this issue so you could all enjoy it. I might comment further on this subject that the logs of all the top winners were especially neat and easy to cross check. Thanks a lot fellows—your efforts were appreciated.

Once again the regular Spring SS Contest, sponsored by RTTY, Inc., will be cancelled in favor of the BARTG Contest which will be held about the second or third weekend in March. As soon as the exact dates are available we will let everyone know so they can "tool up" for this one.

Once again, thanks to everyone who participated in the 1965 RTTY World-Wide SS —it was sure great to have you aboard!

## COMMENTS

"Propagation was nothing special but not bad. All in all, I enjoyed the game once again!" . . . I1RIF.

"It's funny—by the end of the contest you are sick of it—a week later you are looking forward to the next one!" . . . W8CQ.

"Standard of operation was much better but band conditions were bad from here." . . . ZS6UR.

"Do you give a lowest score award? Hi!" . . . W9CTX.

"It was a 'cozy' contest and I'm waiting for next year's go-sign where I hope to run a better station." . . . OZ7OF.

"A very good contest, lots of DX but missed Asia again this year." . . . W8FWG.

"Enjoyed the contest. Looking forward to the next one!" . . . KH6ANR.

"I made a special point to be on the air and put Holland in some of the logs. Thank you for a fine contest." . . . PA0FB.

"My first try at a world-wide RTTY contest. Sure had fun." . . . W9HJV.

"I learned a lot this time and will be back for the next one with an armload of improvements. I would like to thank all the fine guys who carried me through this one!" . . . VE2HL.

"Enjoyed the contest very much. It is better than the SS fone or C W and guess I have found my Utopia in ham radio—RTTY!" . . . K8RFU.

"After preparing for six months—I had the bad luck to burn the plate transformer on my transmitter on the morning of the 17th!" . . . XE1YJ.

"It was good fun and being a new RTTY operator I have gained some valuable experience in operating in contest fashion!" . . . G3LDI.

"Had a terrific time but am a little disappointed over conditions, they sure fooled my calculations which goes to show you can't trust computors." . . . KW6DS.

"The age here is 15 and I slept through school on Monday!" . . . WA8POU.

"Had a jolly good time and although I will not be in the top ten at least I gave out a few points. Hi." . . . G2HIO.

"Loads of fun! ! The spirit and the flesh were willing but—blew a filament transformer Friday night, the wind blew down my 40/80 inverted V on Saturday, high power troubles on Sunday—Murphy's law! ! !" . . . WA6WGL.

"Everyone was very courteous and this was my first chance at some RTTY DX." . . . K7MNZ.

"It was quite a thrill this time because there was activity on the bands almost all around the clock!" . . . SM6CSC.

## FIFTH ANNUAL WORLD-WIDE RTTY SWEEPSTAKES RESULTS

### TOP TEN HIGH SCORERS

| | |
|---|---|
| I1AHN | 62,500 |
| SM6CSC | 56,400 |
| I1ORS | 46,866 |
| K8MYF | 46,448 |
| I1RIF | 46,200 |
| G3MWI | 45,180 |
| ON4BX | 43,600 |
| DJ6ZBA | 43,060 |
| WA4LWE | 42,512 |
| W2RUI | 37,760 |

| Call | Exchg. Points | States | Countries | Continents | Total |
|---|---|---|---|---|---|
| W1GKJ | 204 | 24 | 25 | 4 | 24,896 |
| W1BDI | 56 | 16 | 4 | 3 | 3,296 |
| K1IAG | 20 | 4 | 5 | 3 | 3,080 |
| W2BZT | 58 | 16 | 3 | 2 | 2,128 |
| W1AW | 24 | 8 | – | 1 | 192 |
| W2RUI | 240 | 24 | 32 | 5 | 37,760 |
| W2LNP | 134 | 16 | 19 | 3 | 13,544 |
| WB2AHB | 56 | 13 | 9 | 4 | 7,928 |
| WA2KIZ | 74 | 17 | 6 | 3 | 4,858 |
| W2FAN | 60 | 10 | 7 | 2 | 3,400 |
| K2YEO | 22 | 5 | 3 | 2 | 1,310 |
| W2UJS | 54 | 16 | 1 | 1 | 1,064 |
| W3KDF | 166 | 14 | 28 | 5 | 30,324 |
| W3PYW | 128 | 18 | 24 | 5 | 26,304 |
| WA4LWE | 304 | 29 | 34 | 5 | 42,816 |
| W4AIS | 163 | 18 | 22 | 5 | 24,934 |
| K4CG | 116 | 20 | 17 | 4 | 15,920 |
| W4COI | 182 | 25 | 16 | 3 | 14,150 |
| W4GIY | 96 | 6 | 10 | 4 | 8,240 |
| K4VDM | 62 | 16 | – | 1 | 992 |
| W4AWY | 18 | 5 | 2 | 2 | 890 |
| K50LU | 192 | 20 | 16 | 5 | 19,840 |
| WA6WGL | 180 | 24 | 17 | 4 | 17,920 |
| W6EV | 114 | 21 | 11 | 4 | 12,194 |
| W6CG | 44 | 7 | 11 | 4 | 10,708 |
| W6LVQ | 44 | 10 | 10 | 3 | 6,440 |
| W6WLI | 80 | 17 | 4 | 2 | 2,960 |
| W6MTJ | 42 | 7 | 3 | 3 | 2,094 |
| W6IWO | 40 | 10 | 2 | 2 | 1,202 |
| W60WP | 4 | 1 | 2 | 2 | 804 |
| W7ESN | 284 | 29 | 21 | 5 | 29,236 |
| K7MNZ | 120 | 22 | 9 | 4 | 9,840 |
| W7CBY | 60 | 13 | 6 | 2 | 3,180 |
| W7LI | 18 | 8 | 3 | 2 | 1,344 |
| W7HFH | 37 | 10 | 1 | 1 | 570 |
| K8MYF | 352 | 27 | 38 | 5 | 47,504 |
| K8CO | 210 | 26 | 30 | 5 | 35,460 |
| WA8POU | 200 | 26 | 30 | 5 | 31,200 |
| W8FWG | 212 | 23 | 14 | 5 | 18,876 |
| K8RFU | 186 | 18 | 16 | 3 | 12,948 |
| W8OMY | 60 | 17 | 1 | 1 | 1,220 |
| W9BCY | 204 | 22 | 23 | 5 | 27,284 |
| K9QNV | 108 | 19 | 10 | 3 | 8,052 |
| W9HXW | 98 | 18 | 7 | 4 | 7,364 |
| W9HJV | 24 | 2 | 9 | 3 | 5,448 |
| W9CTX | 40 | 14 | 3 | 2 | 1,760 |
| W0RX | 86 | 17 | 8 | 3 | 6,262 |
| W0FQW | 38 | 7 | 7 | 4 | 5,866 |
| DJ6ZBA | 790 | 14 | 32 | 5 | 43,060 |
| F2FO | 310 | 11 | 10 | 4 | 11,410 |
| F3PI | 160 | 5 | 7 | 4 | 6,400 |
| G3MWI | 1070 | 23 | 26 | 4 | 45,410 |
| G2HIO | 510 | 13 | 14 | 4 | 17,830 |
| G3LDI | 330 | 11 | 8 | 2 | 6,830 |
| GM3IQL/A | 330 | 13 | 8 | 2 | 7,750 |
| HB9P | 320 | 7 | 12 | 2 | 8,040 |
| I1AHN | 1300 | 24 | 34 | 5 | 65,200 |
| I1ORS | 946 | 21 | 27 | 5 | 46,866 |
| I1RIF | 1010 | 20 | 26 | 5 | 46,200 |
| I1KG | 540 | 16 | 13 | 4 | 19,040 |
| I1LCF | 210 | 10 | 8 | 2 | 5,300 |
| KA2RJ | 10 | – | 1 | 1 | 10 |
| KH6ANR | 42 | 7 | 4 | 3 | 2,694 |
| KP4AQL | 84 | 10 | 8 | 4 | 7,240 |
| KW6DS | 570 | 13 | 13 | 5 | 20,410 |
| ON4BX | 880 | 20 | 26 | 5 | 43,600 |
| ON4IIW | 460 | 12 | 16 | 4 | 18,320 |
| OZ7OF | 120 | – | 6 | 1 | 1,320 |
| OZ8US | 160 | 2 | 8 | 3 | 5,120 |
| PA0FB | 200 | 7 | 16 | 2 | 7,800 |
| SM6CSC | 1400 | 22 | 32 | 4 | 56,400 |
| SM6AEN | | (Check Log Only) | | | |
| VO1DZ | 14 | 3 | 5 | 2 | 2,042 |
| VE2HL | 124 | 20 | 21 | 3 | 14,080 |
| VE3IR | 58 | 9 | 20 | 5 | 20,522 |
| VE3GK | 90 | 13 | 12 | 3 | 8,370 |
| XE1YJ | 44 | 13 | 5 | 2 | 2,572 |
| ZL1WB | 70 | 2 | 5 | 3 | 3,140 |
| ZS6UR | 560 | 19 | 16 | 3 | 20,240 |
| 4M5A | 252 | 24 | 25 | 2 | 16,048 |

## OFFICIAL BULLETIN NR 37
## From ARRL Headquarters, Newington, Conn., Dec. 9, 1965
## To All Radio Amateurs

A reciprocal operating agreement becomes effective immediately between the United Kingdom and the United States. Amateurs of one country visiting or residing in the other may obtain permission to operate their own amateur stations there. The current note covers the British Isles only. Separate agreements will be needed for other parts of the Commonwealth and the Crown Colonies. The United States has previously reached such agreements with Australia, Belgium, Bolivia, Canada, Colombia, Costa Rica, the Dominican Republic, Ecuador, Luxembourg, Peru, Portugal and Sierra Leone. Many others are being negotiated and successes will be announced as they occur.

LOU, I1ORS

ARTHUR, ON4BX

# THE W7ARS TUNEABLE FILTER FOR RTTY

**WALTER E. NETTLES, W7ARS**

**8355 Tanque Verde Road, Route 2, Box 694R, Tucson, Arizona 85715**

QRN is awful, QRM is worse and that weak station's shift doesn't match any of my plug in tuned circuits—this must be a horrid dream! But! 'The Nettles Nightmare' offers a partial solution to this dilemma as well as giving you other advantages to make your 'RTTY' hobby more fun.

This selective audio tuner will work well with almost any type of terminal unit after slight modifications but since it seems the K6IBE limiterless two-tone converter model TU-D and similar types are the most prevalent at the present time, this version of a tuneable audio circuit is presented with that in mind.

The following modifications are required on the conventional K6IBE TU-D converter. Disconnect all wires and components attached to the grid connection on the input tube number V1 which is a 12AU7. Install a .47 megohm ½ watt 10 percent tolerance resistor from each grid of V1 to ground. Run a small shielded wire from each of the grids of V1 to a suitable connector to be installed on your chassis. The shields on the respective wires are to be grounded. Use caution and avoid shorting the inner conductor to the shield. Remove both of the toroids and capacitors shunting them from the plates of V1. From each plate of V1 install a 47K ohm 1 watt 10 percent tolerance resistor to the positive plate voltage of 320 volts. The .001 UFD coupling condensers attached to the plates of V1 remain in the circuit. To this suitable connector on the chassis, bring out 6.3 volts AC from the filament winding as well as the positive and negative for the 320 volts DC. Audio voltage for the conventional cross display on your 'scope' may be taken from either the plates of V1 or V2, depending on what audio voltage you require for the deflection plates on your cathode ray tube. Either the center tap of the 6.3 volt AC winding or one side of it should be grounded to prevent possibility of feedback through the filament circuit with the tuner. If, for some reason such as use with a 'scope' this is not feasible, then use a separate 6.3 volt AC filament transformer for the tuner.

It is recommended that this tuner be adjacent to your receiver since you will in all probability tune in the various shifts as often as you tune in an 'RTTY' station. You will tune in the low frequency tone by adjusting either your dial or the BFO on your receiver as you watch your 'scope' pattern. Then tune in the higher pitched tone with your audio tuner as you continue to watch the 'scope' pattern. Then throw the reversing switch on your TU-D to the proper position to print as either tone may be mark or space depending on which side your BFO is beating with the incoming signal and also whether the sending station is shifting up or down in frequency on space data.

V1 and V2 are both phase shifters in the respective legs giving 180 degrees of phase shift at the frequency where the reactance of the capacitors in the plate circuit matches the resistance of the resistors in the cathode circuit. The first section of both V3 and V4 serves both as a cathode follower and a conventional voltage amplifier. The output of the cathode follower which is the same phase as the output of our preceding phase shifter feeds the second section of V3 or V4. The output of V3 and V4, of course, is 180 degrees out of phase with its input, thus making 360 degrees or 0 degrees of shift, hence making positive feedback and oscillation possible when R20 and R21 are advanced past a certain point. Oscillation we do not want but the gain and selectivity that goes with controlled regeneration is very useful and desired. In actual use, advance R20 and R21 to the point where oscillation takes place, then back off slowly until it ceases and if need be a bit further should there be any tendency for the pattern on your scope to waver and appear unstable. You will find that you don't need the last little bit of selectivity and print as well even on 85 or 170 shifts without it. V5 is simply a voltage amplifier to bring the signal up enough to drive your present TU-D. V6 serves a most necessary purpose, as without it the selective tuner would be exceedingly erratic and unstable.

Basing data is so readily available on tubes that we will not touch on that except to point out that the filament of the 12AX7 is either 6.3 volts in parallel or 12.6 volts in series. You will, of course, use the filaments or heaters wired in parallel. Also, the base of the OA2 readily permits R34 to be hooked up in such a manner so that plate voltage is removed from the tuner if V6 is removed for any reason. You could do the same thing with the filaments of the 12AX7 tubes at the base of the OA2 but there is little point to going to the bother and it would definitely require that one side be grounded and actually it is better if you can ground the center tap of the 6.3 volt AC winding.

Resistors R4, R5, R6, R7, R10, R11, R12, R13, R14 and R15 are one watt size not because of the power requirements but this size is much more stable over long periods of time than are the smaller ones. The 1200 ohm and 2400 ohm resistors in the cathode and plate of each section of the 12AX7A phase shifters, although not too critical as to value, should be matched as closely as possible for best results. Instead of paying more money for 5 percenters, some of you may prefer buying several extra 10 percenters at a cheaper price and matching them in pairs with a good ohmeter. For example R4 and R6 should match and R5 and R7 should match, but it is not necessary that the two pairs be exactly the same value. R14 and R15 should be matched reasonably close. R8 and R9 will compensate for any slight difference in the values in the two legs.

**Continued . . .**

**THE W7ARS TUNEABLE (Continued) . . .**

With C3 and C6 fully meshed and R8 and R9 adjusted to approximately 1000 cycles, you will be able to tune up to about 4000 cycles when the plates are fully opened. The frequency coverage will be determined somewhat by what frequency you decide to use as your lower frequency which is determined by the setting of R8 and R9. You will no doubt decide upon a low frequency that will permit you to straddle the center of the bandpass of your receiver with the two incoming signals. In my own case, my receiver happens to have a crystal BFO and the center or my most selective bandpass of 300 cycles width happens to be about 1000 cycles difference, therefore my lowest audio circuit is adjusted for about 900 cycles. An incoming signal with 170 cycle shift straddles the middle portion of the bandpass nicely. When used for AFSK, you will have no choice except to adjust R9 for the lower tone and C3 and C6 for the higher pitched tone. As a rule these tones will be close to 2125 and 2975 cycles. R8 should always be adjusted with the capacitors C3 and C6 fully meshed to the same frequency as set by R9 to assure uniform gain in both legs at all frequencies.

This tuner requires very little input voltage for peak performance. In fact, if you crowd it with too much input you will lose all the advantages and the selectivity will be poor. After checking the audio level at which several RTTY operators run their receivers, it seems that R35 and R36 fit the situation about right when 27K ohm is used for voice coil output voltage at the receiver and 220K ohm is used for 500 or 600 ohm output voltage. In either case the output impedance of the receiver is well matched with R1 at 8 ohms for voice coil outputs and R1 at 600 ohms for the higher impedance output. Also by varying R1 gives you great latitude as to the loudness at which you run your speaker. However, if you normally run your receiver with the volume very low and by advancing R1 to maximum does not give you sufficient input to the tuner, then the only alternative is to reduce the ohmic values of R35 and R36. We have tried to hit a happy medium but if it does not suit your listening habits, it is simple to find the value needed by experimenting.

Try to think of this as a stereo amplifier when you're laying out the parts. Keep the two legs well separated physically so there will be a minimum of stray coupling between them. A metal shield of aluminum right down the middle will do no harm. Lay it out so that the components themselves with short leads make up the bulk of the wiring. Use small shielded wire popular for phonograph leads, preferably teflon insulation so you won't short the shield to the conductor, always with the shield grounded, for any fairly long runs such as to the potentiometers, input and output connectors, etc.

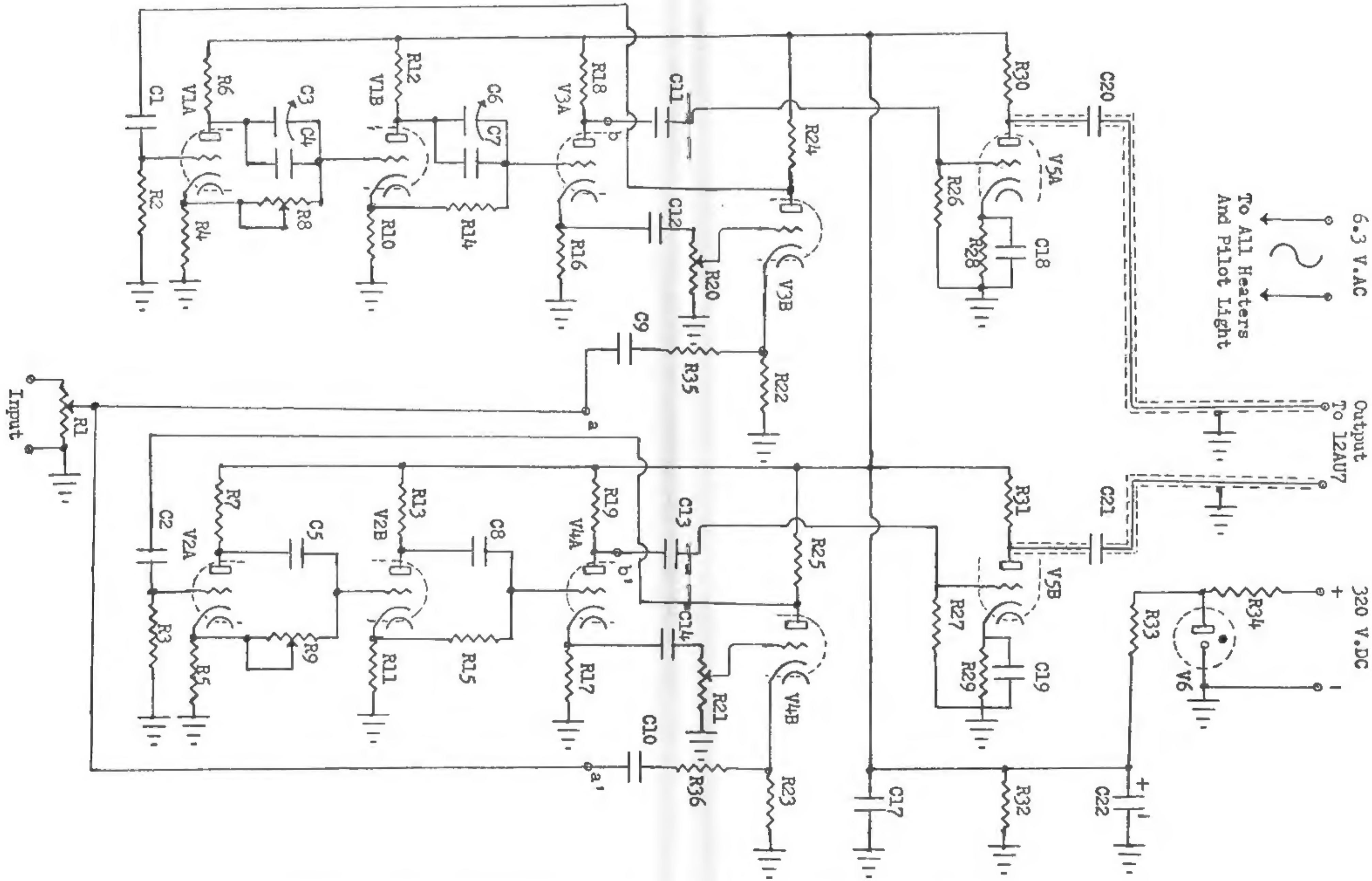
Actually you will end up using only two controls, one—the frequency control for the high frequency tone which is the ganged variable capacitors, and two—R1 which determines your input voltage from the receiver. The other controls are of the 'set and forget' type. By slightly adjusting either R20 or R21, you can balance the gain of the two legs all the way to your Schmitt trigger tube in your TU-D.

Don't assume you can vary R8 and R9 and dispense with C3 and C6 because you will find it impossible to keep your outputs balanced. Your output would be much greater on the high frequency leg than on the low frequency leg, since the capacitive reactance in the plate circuits of V1 and V2 is much greater at low frequencies.

This one stage properly adjusted and used, will do a good job for you on 170 cycles and not too badly at 85 cycles. There are some advantages to a single stage, but if additional selectivity is desired, it is quite simple to add another stage. It will require ganging four variable condensers and insulating them from each other as well as ground if equal gain is desired at all shifts in the two legs. The number of controls will be doubled except for R1, but this is of no great import, since they are of the 'set and forget' type as mentioned above. Open the circuit at small A and small A, then repeating all of the circuitry pertaining to V1, V2, V3 and V4 up to point small B and small B'. Connect the input of the additional stage to R1 and the plates of the output tube sections to the .05 UFD. 400 VDC. capacitors C9 and C10 and change R35 and R36 to 150K ohm ½ watt 10 pct. tolerance resistors. For two stages, change R33 to 3000 ohm 2 watt 10 pct. tolerance.

Perhaps a simpler method from a construction standpoint in the event extreme selectivity is desired, would be to utilize the mixer

**Continued . . .**



'THE NETTLES NIGHTMARE' VARIABLE FREQUENCY AUDIO TUNER FOR

THE K6IBE MODEL TU-D TWO-TONE CONVERTER AND SIMILAR CIRCUITS

**THE W7ARS TUNEABLE (Continued) . . .**

circuit described by W6ZH in the July 1965 issue of RTTY Magazine. Dispense with C3, C4, C6 and C7 and replace them with 220 UUFD. silver mica capacitors. Adjust R8 and R9 for the desired 1860 and 1140 frequencies and, of course, F1 and F2 as shown in this schematic will not be required. I have used this method and it performs perfectly but is more difficult for me to tune and sometimes causes a bit of confusion especially on narrow shifts.

Gentlemen, I have tried to cover everything I can think of that might be a problem including the several pitfalls to watch out for. But if you have a question that I can answer, I will be most happy to oblige. You should now be able to print signals, regardless of what reasonable shift they are using, solid that previously gave you a rough time. Let the tuner take care of the nightmares now when you run into those horrid situations that previously thwarted every attempt you made to unravel, even going so far as to trying to print on only space or only mark information. There's quite a few decibels advantage in having both mark and space signals tuned on the nose. Tap it lightly, and

73, W7ARS

## PARTS LIST

| Schematic No. | Description of Item | B-A Catalog and Page No. | | Price |
|---|---|---|---|---|
| CR, C7 | .0001 UFD. Silver Mica Cond. | 15B191 | 67 | $0.18 |
| C5, C8 | .0004 UFD. Silver Mica Cond. | 15B191 | 67 | $0.30 |
| C11, C13, C20, C21. | .01 UFD. 400 VDC. Tubular | 18A446 | 208 | $0.12 |
| C1, C2, C9, C10, C12, C14. | .05 UFD. 400 VDC. Tubular | 18A469 | 208 | $0.14 |
| C17, C18, C19 | .1 UFD. 400 VDC. Tubular Cond. | 18B475 | 208 | $0.18 |
| C22 | 40 UFD. 150 WVDC. Electrolytic | 15A413 | 208 | $0.49 |
| C3, C6 | .0003 UFD. Variable Bud 910 | 17A69 | 89 | $3.59 |
| R1 (See Text) | 8 or 600 Ohm Wire-Wound Pot. | 14A500 | 63 | $1.35 |
| R28, R29 | 1800 Ohm ½ Watt 10 Pct. Tol. | 12A998 | 209 | $0.10 |
| R4, R5, R6, R7 | 1200 Ohm 1 Watt 5 Pct. Tol. | 15B1001 | 61 | $0.36 |
| R22, R23 | 2200 Ohm ½ Watt 10 Pct. Tol. | 12A998 | 209 | $0.10 |
| R10, R11, R12, R13. | 2400 Ohm 1 Watt 5 Pct. Tol. | 15B1001 | 61 | $0.36 |
| R33 | 4700 Ohm 2 Watt 10 Pct. Tol. | 15A1005 | 61 | $0.24 |
| R16, R17 | 6200 Ohm ½ Watt 10 Pct. Tol. | 12A998 | 209 | $0.10 |
| R34 | 10K Ohm 10 Watt Wirewound | 26A121 | 209 | $0.54 |
| R24, R25 | 22K Ohm ½ Watt 10 Pct. Tol. | 12A998 | 209 | $0.10 |
| R18, R19 | 27K Ohm ½ Watt 10 Pct. Tol. | 12A998 | 209 | $0.10 |
| R35, R36 (See Text) | 27K or 220K ½ Watt 10 Pct. | 12A998 | 209 | $0.10 |
| R32 | 100K Ohm 2 Watt 10 Pct. Tol. | 15A1005 | 61 | $0.24 |
| R30, R31 | 120K Ohm ½ Watt 10 Pct. Tol. | 12A998 | 209 | $0.10 |
| R14, R15 | 390K Ohm 1 Watt 10 Pct. Tol. | 12A999 | 209 | $0.15 |
| R26, R27 | 470K Ohm ½ Watt 10 Pct. Tol. | 12A998 | 209 | $0.10 |
| R2, R3 | 2.2 Megohm ½ Watt 10 Pct. | 12A998 | 209 | $0.10 |
| R8, R9, R20, R21. | 1 Meg. Linear Taper Pot. | 18C435 | 209 | $0.44 |
| V1, V2, V3, V4, V5. | 12AX7A Dual Triode Tube RCA | 12AX7A | 53 | $1.18 |
| V6 | OA2 150 Volt Regulator RCA | OA2 | 55 | $1.32 |
| (Five) | 9 Pin Miniature Wafer Sockets | 18B455 | 210 | $0.08 |
| (One) | 7 Pin Miniature Wafer Sockets | 18A1083 | 210 | $0.06 |
| (One) | 3" Velvet Smooth Vernier | 17C272 | 211 | $2.39 |
| (Five) | Knobs (0 to 10) (Blk. or Gray) | 17A672 | 211 | $0.39 |
| (One) | Pilot Lamp No. 47 | 16A161 | 71 | $0.14 |
| (One) | Dialco 810 Lamp Holder with Removable Jewell (Red) | 12A1161 | 70 | $0.32 |
| (Two) | NTX10 Insulated ¼" Coupling | 12A1361 | 89 | $0.67 |
| (One) | Bearing with ¼" Shaft 3" Lg. | 12A9 | 89 | $0.37 |
| (One) | Contour Utility Cabinet (Bud) 5-7/32 x 8-7/4 Inches | 5A250 | 90 | $9.10 |
| (One) | Miniature Aluminum Chassis (Bud) 7 x 8 x 2 Inches | 5A221 | 91 | $1.17 |

Miscellaneous hardware, hookup wire, small shielded wire, solder, etc., not checked out but available in the 1966 Burstein-Applebee Co. catalog No. 661 just off the press. Mail orders promptly filled from either 1012 McGee St., Kansas City, Mo. 64106 or 1237 Sixteenth St., Denver, Colo. 80202.

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The circuit below was received from K6WA, who writes, "I dissected one of the flat Collins "transmit" units; circuit is as shown. Have not made any electrical tests yet. Circuit is potted in wax, and heat lamps let you de-wax it without apparent damage. 73 Blackie, K6WA.

ARRL RTTY BROADCAST SCHEDULE: Sunday, Tuesday, Wednesday, Thursday, Friday and Saturday at 0400 GMT. Contact with amateur RTTY operators after broadcast on Sundays, frequencies 3.625 and 14,095 KCS.

**ADDITIONAL COMMENTS . . .**

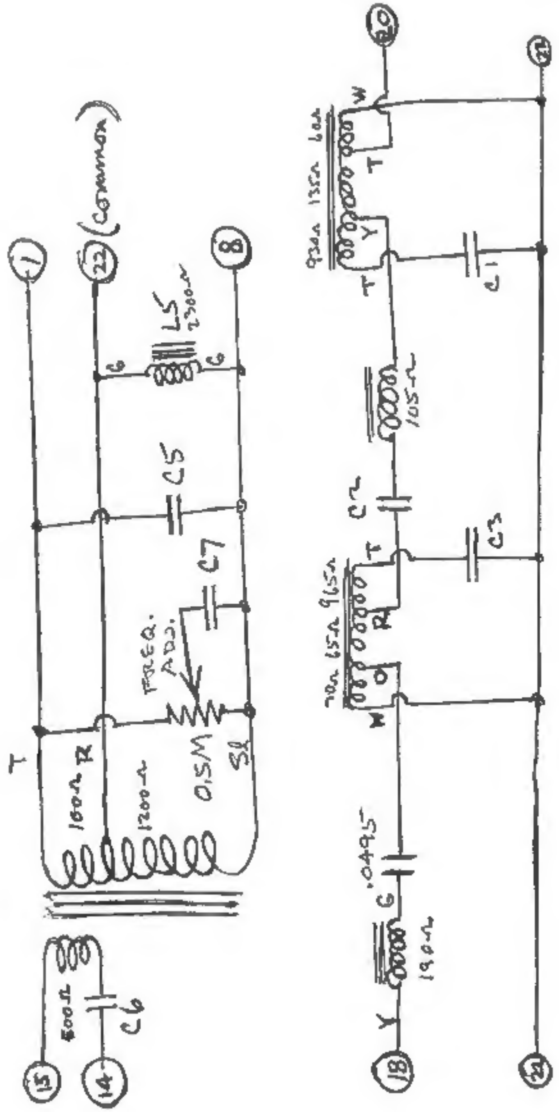
"Got a big kick out of the SS and am amazed at the number of stations with this capability!" . . . K2YEQ.

"Band conditions were excellent—will be looking forward to the next one." . . . W4GJY.

"Sorry so many fellows don't like the scoring. I think it is fine. I have fun and enjoy it no matter how you score." . . . K8MYF.

"Enjoyed the contest tremendously and hope to compete again next year." . . . K5OLU.

"This was my first time on RTTY and I sure enjoyed it . . ." . . . K3WUW.



# TRANSISTOR VFO (for FSK RTTY)

### MEL POLLOCK, K0CTD

Putting RTTY on HF (FSK) can be a problem, especially when crystals are scarce and many frequencies must be covered or the ability to move around is desirable.

FSK in HF bands requires stability and minimum long-term drift which rules out a lot of VFO circuits with their time-consuming temperature compensating procedures and heat generating vacuum tubes.

CDR Paul Lee, W3JHR, wrote two articles in "CQ" using the ARC-5 command set as a source for the "LOW COST VFO" and its later transistorized version.

The transistor VFO seemed to suit my needs, since I had previously built the "LOW COST VFO" and found it too unstable to be of any value. Reassured by the literary claims, I dug out the one I had previously assembled and proceeded to follow the scant directions.

I added a diode keyed frequency shift circuit to it and it worked "as advertised". Not, however, without considerable effort and experimenting on my part. For those who have never tried the previously referenced conversion we will try to explain it step by step as briefly and clearly as possible.

1. Remove the flexible shaft between the final tuning capacitor in the ARC-5 transmitter.
2. Remove and discard the VFO tuning capacitor and the final padding capacitor.
3. Remove all wiring to the eye tube, crystal and oscillator tube sockets and to the VFO coil and capacitor above the chassis. Remove the VFO coil and padder capacitor assembly and shield cover from the top of the chassis and lay them aside for re-assembly.
4. Check and write down the dimensions of the mounting holes for the final tuning capacitor from the front panel. You will need these to determine where to cut the chassis off just to the rear of the 1625 tube sockets.
5. Grind off or drill out the rivets which mount the front panel. Remove the front panel and final tuning capacitor with its dial and drive assembly. Save the capacitor and dial assembly for mounting in place of the VFO tuning capacitor.
6. Using the dimensions from step 4, cut off the chassis as mentioned and mount the front panel to the rear section using screws or rivets as is most convenient. Note that the top of the chassis must be bent upward in the middle immediately behind the panel to clear the dial drive gear when the assembly replaces the VFO tuning capacitor.
7. Install a small RF coax connector and convenient power and FSK keying lead connector in the rear of the chassis. The original power socket was removed and an octal tube socket was used in the same hole on my model.
8. Replace the VFO padder capacitor and the VFO coil. The winding on the outside of the form is used and the small winding on the ceramic form inside the large form may be removed and discarded. Mount the capacitor and dial assembly in place of the original VFO tuning capacitor.
9. Wire the circuit in figure 1. C3, C4 and C5 should be molded mica (postage stamp) or dipped silver mica capacitors.
10. Set the shield and slug assembly loosely over the coil and padder capacitor to facilitate pruning of the coil or changing the padder setting when adjusting to desired frequency. Final settings should be made with the shield fastened down with all its screws.

Power for the VFO was supplied by two 6-volt lantern batteries in series. The current drain is small and these should last for a long time.

A grid-dip meter or general coverage receiver is a must when calibrating or locating the frequency of oscillation and adjusting to desired range.

The circuit covers about 200 KC and the output is 0.1 to 0.2 volt.

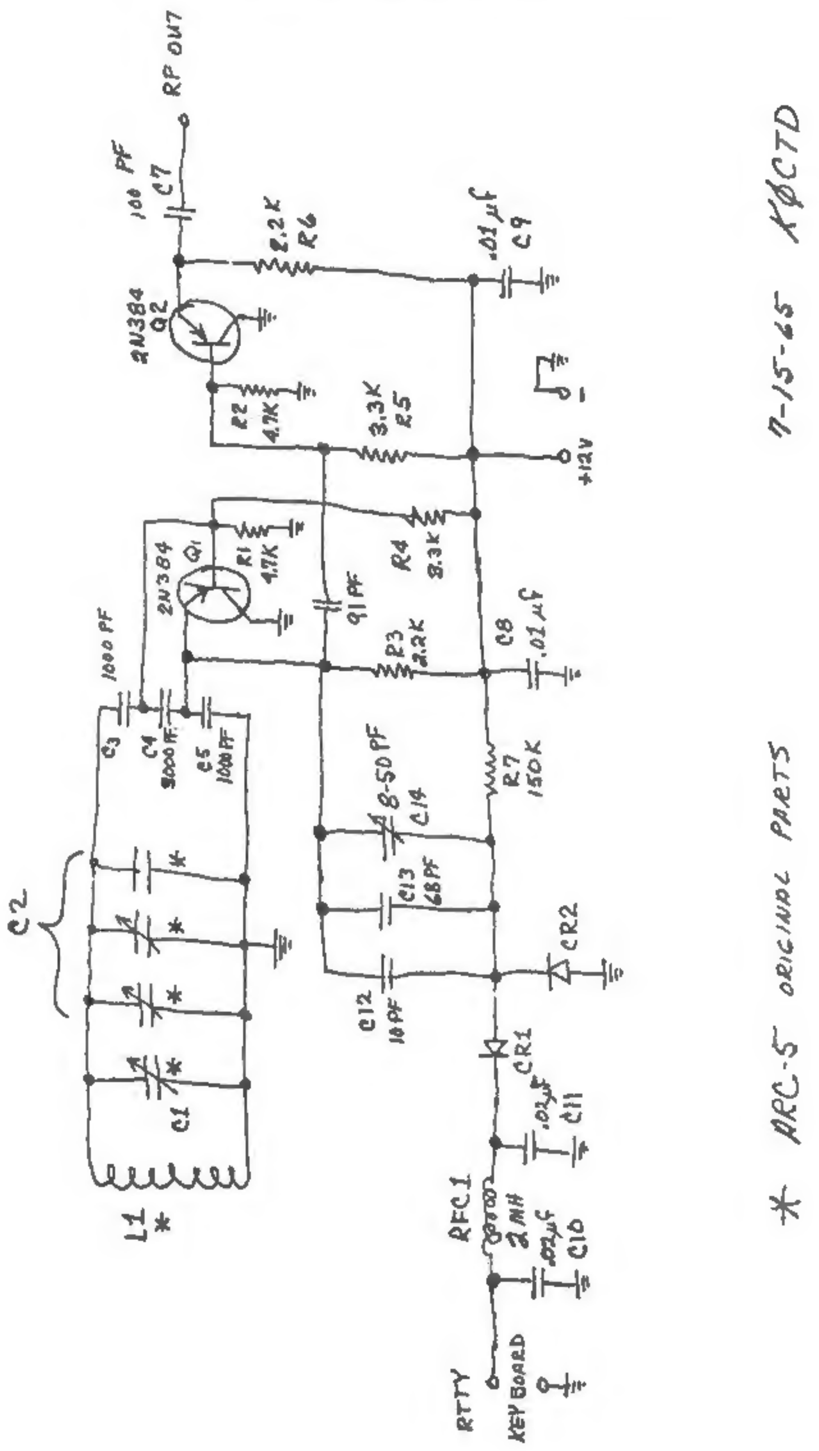
Frequency shift when RTTY keying depends on the frequency of operation and the LC ratios used. The values shown produced 850 cps shift at 3231 KC. More capacity at C12 and C13 was needed at 3315 KC MARS frequency. "CUT and TRY" until you achieve the desired shift.

When you get the panels on after final adjustments, I believe you will be as pleased as I was at the results of your effort.

Even if you don't work RTTY just leave out C10 through C14, R7, CR1 and CR2 and the RF choke; you still have a fine VFO for a small investment.

K0CTD

*From Bandsread, P.O. Box 1346, Cedar Rapids, Iowa



# RTTY-DX

BUD SCHULTZ, W6CG
5226 N. Willmonte Avenue
Temple City, California 91780

Hi, DX'ers:

The Contest summary in this issue took so much space that this will be shorter than usual, so let's skim the cream off the top of the goodies this month and get back in the regular routine next issue. Top new one of the past few weeks is 5X5FS in Uganda. His name is Terry and Ed, K3GIF, had the honor of managing the first RTTY QSO with him. According to reports 5X5FS has a fine signal into the States with excellent FSK and has been quite consistent. FG7XT reports that Terry has a sked with WA2NWW, so this should be a source of information as to his operating hours. On Dec. 3rd WA2NWW also reported to Jean that he printed JA8RUL and XU2EN working UA4KN on RTTY. This is probably the rarest combination of DX that has crossed this desk in many a month. Certainly hope it is a sample of things to come! However, in case some are not aware of the regulations it might be well to point out that XU (Cambodia) is "verboten" to USA Hams, so just in case you are able to print this one remember it's OK to look but must not touch! Also on the sour note side—JA stations are not licensed for RTTY on 20 although it's OK to work them if they are available. There may be some question as to whether a station operating illegally would count as a new Country. I am pretty sure the ARRL would not accept a JA worked on 20 meters as legitimate (on RTTY—CW and phone is OK, of course). Jean, FG7XT has worked OK1KUL, UB5AC, UB5UN, UR2BK, and UR2KAX recently and that is really something to be proud of! Jean now has 49 countries on RTTY but is still trying to catch K3GIF who has 52. It certainly begins to look like there will be at least two stations in the DX CC on RTTY before 1966 has passed. Ed, K3GIF has just returned from a visit to FG7XT and tells me that the DX starts to roll in on Guadeloupe about 1100 GMT and just keeps on all day!

Two new ones showed up this month on Puerto Rico—KP4CMK and KP4CMP. Both are with the USCG and are very active. Orbra, EL2F, continues to pound in regularly on 20 with a fine signal. Also several stations report working Chris, ZS6BCT, in the past few weeks, so Africa is once again readily available for those needing the dark continent. W8NTZ/VO2 is having a ball on RTTY from Goose Bay Labrador. He tells me he wishes he had learned about the fun of RTTY sooner. At the moment he is the only active station on Labrador but expects some competition soon. He is a flight surgeon with the USAF.

Europe continues to pound in here on the Coast with most countries showing a marked increase in activity. F2KC and F3PI are regulars now and are often joined by F8KI. ON4BX comes thru with a booming signal as do HB9ET and HB9IT. Josef, DJ6ZBA, is very consistent and is usually the last signal to fade out here. The Italian group are very numerous now and activity there is very strong. I1ROL comes rocking thru nearly every day here.

From down under comes a fine letter from Bill, VK2EG, who wishes to send Holiday greetings to all his friends thruout the World. Bill would like us to publish a list of addresses of the DX stations from time to time so one might QSL direct. It seems like a real good suggestion and we shall start such a policy in the very near future as space permits.

Lou, I1ORS, writes that he worked PY2ON, Steve, from Sao Paulo recently on 20 meters around 2100 GMT. I should also like to correct a statement I made earlier in this column about 5X5FS. I1ORS was the first RTTY QSO with 5X5FS and K3GIF was the first "W" QSO. Sorry, Lou and Ed. As a matter of fact —Lou was responsible for getting Uganda on RTTY—he spent several weeks helping Terry get things going. Nice work, Lou, and your efforts are appreciated.

Well, Gang, it's time to write "30" to this one but will be back here again next month. Thanks for your time and help. Also thanks to I1ORS, K8DKC, FG7XT, K3GIF, VK2EG, for mailing in news.

73 and loads of DX in '66

Bud, W6CG

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## HORSE TRADES

**FOR SALE:** Model 14 typing reperf, two at $60.00 each, sync motors. One model 14 typing reperf, recv, only $50.00. Two model 15 printing units with keyboards and sync motors, NO Covers, $50.00 each. One model FRXD typing reperf and TD with cover, sync motor, $75.00. K6JDN, 15206 Maidstone Avenue, Norwalk, California 90651.

**FOR SALE:** Model 19 printer, with 14TD, table and power supply complete, $175.00. Also table for model 15, $10.00. W4TRJ, 824 South Lincoln Street, Arlington, Virginia 22204.

**FOR SALE:** Two model CV-57 RCA converters (URA-6), one in operation, the other less tubes, and case, swap for a CV-60. Also have a Northern Radio #152. Swap Siemens page printer, unknown type, marked 9T EMPF ITI and Blattschrieber SH. Looks like a model 15, will swap. Gordon E. White, 5716 North King's Highway, Alexandria, Virginia 22303.

**WANTED:** LXD TD for 28ASR and LPR typing reperf also for same. Have CV-57, frequency shift monitor, TT-63. Send SASE for list. W8KDW, R.D. 1, Box 173, Doylestown, Ohio 44230.

**FOR SALE:** Teletype paper and tape. Send SASE for information, WA2TEK, 33 Roosevelt Street, Pequannock, N.J. 07440.

**FOR SALE:** Teletype paper 8½" standard rolls, $8.00 case of 12 rolls. Teledeltos (electro sensitive fax) 8 channel chart recorder paper, 12" wide, 6" diameter roll, $1.00. PINK Manifold 8½" x 11" 1,000 sheet pack, $.95 (sample for SASE). All paper new original packaging. REC-29 RA-87 power supply, $6.00. Model 101, $35.00. Model 26 with oak table, $60.00. Model 15, $75.00. Heath DX-35, like new, $35. 0-150 VAC 2" new meters, $1.50. W2DLT, 348R Essex, Stirling, N.J. 07980.

**FOR SALE:** TM (technical manuals), send SASE for list. Quaker Electronics, P.O. Box 215, Hunlock Creek, Pa.

**FOR SALE:** Model 14, 15, 19 and 28s. Parts and various Teletype parts. Send SASE for list. W6VPC, 1067 Mandana Blvd., Oakland, California 94610.

**FREE:** 1966 Annual catalog No. 661. Burstein-Applebee Co., 1012 McGee Street, Kansas City, Mo.
1237 Sixteenth Street, Denver, Colorado (for those hard to find TU parts).

**WANTED:** Your call and zip code number when writing RTTY.

**WANTED:** Jumper cable No. W-1402 or W-1602 used in CM-14/URR or CV-57/URR, and W.E. 275-B Relay. W8ESH, P.O. Box 1034, Huntington, W. Va. 25713.

## NEWS

F1 radioteleprinter operation is currently authorized in the non-voice portions of the 80, 40, 20 and 15 meter bands. To bring ten meters into line with this basic allocation principle on other high frequency bands, the ARRL executive committee has directed the filing of a petition with the Federal Communications Commission seeking authorization for RTTY in the A1 segment 28.0 to 28.5 megacycles. It is anticipated that, as on other bands, RTTY stations will voluntarily select a spot frequency or two to centralize such activity.

Hint for free TTY paper. Contact your local 3M dealer for the names of the firms using their 209 photocopier. It uses a TTY size roll of processing paper that is run thru once and then discarded. A busy office may use one roll a day. K8ERV, 1066 Larchwood Road, Mansfield, Ohio.

It is with regret we print the following: Hal C. McCracken, W7WJ, passed away Friday the 19th November, 1965. We have lost a long-time friend and fellow RTTYer. W7LI, W7WWG.

NOTICE: Subscriptions which expire during 1966 can be renewed through December, 1966, ONLY. Make renewals for number of months between expiration and end of year at rate given on page 15.

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